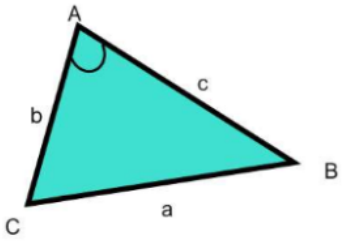
COSINE RULE FOR ANGLES

THINK! Can you rearrange the Cosine rule so the subject is the Cosine of the angle?



Begins and finishes with the same letter.

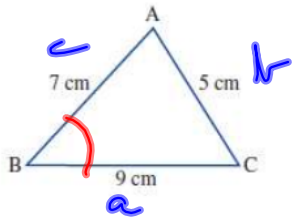
$$Cos\ A = \frac{b^2 + c^2 - a^2}{2bc}$$

Need all three sides to use this formula.

THE HINT

- The largest angle is always opposite the largest side.
- A negative ratio means an obtuse angle
- Worded problems always begin with a diagram and end with a statement.

Find the size of angle *B* in the triangle on the right, correct to the nearest degree.

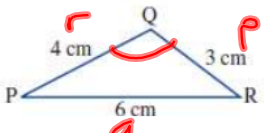


$\cos B = \frac{a^2 + c^2 - b^2}{2ac}$ (c, b, a)

$\cos B = \frac{9^2 + 7^2 - 5^2}{2 \times 9 \times 7}$

$\cos B = \frac{5}{6} \quad \therefore B = 34^\circ$

Find the size of angle *Q* in the triangle on the right, correct to the nearest degree.

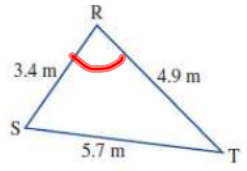


$\cos Q = \frac{p^2 + r^2 - q^2}{2pr}$ (r, p, q)

$\cos Q = \frac{4^2 + 3^2 - 6^2}{2 \times 4 \times 3}$

$\cos Q = \frac{-11}{24} \quad \therefore Q = 117^\circ$

Find the size of the largest angle in the triangle drawn on the right.

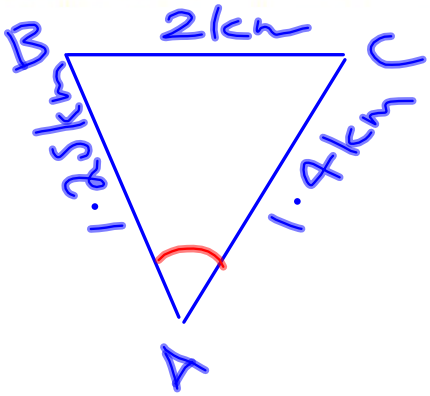


$\cos R = \frac{t^2+s^2-r^2}{2ts}$

$\cos R = \frac{3.4^2+4.9^2-5.7^2}{2\times 3.4\times 4.9}$

$\cos R = \frac{11}{119} = 85^\circ$

Two paths diverge from a point, A. The first path goes for 1.25 km to a point, B. The second path goes for 1.4 km to a point, C. B and C are exactly 2 km apart. Find the angle at which the two paths diverge.



(3)

$\cos A = \frac{b^2+c^2-a^2}{2bc}$

$\cos A = \frac{1.4^2+1.25^2-2^2}{2\times 1.4\times 1.25}$

$\cos A = -\frac{191}{1400}$

$A = 98^\circ$

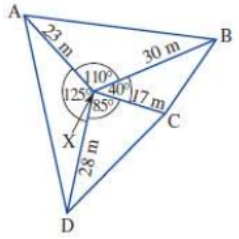
The 2 paths diverge at 98°.

RADIAL SURVEYS

PLANE TABLE RADIAL SURVEY

This survey involves a series of arms that are drawn toward each corner of the field. The distance is then added to each arm.

The figure on the right is a plane table survey of a block of land. Calculate the perimeter of the block of land, correct to the nearest metre.



$AB = 44m$

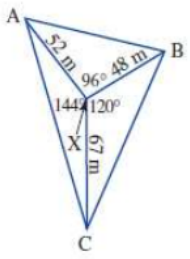
$BC = 20m$

$DC = 31m$

$AD = 45m$

$\therefore$ Perimeter $= 140m$

Calculate the area of the field on the right. Give your answer correct to the nearest square metre.



ΔAXB: $A = 1241\ m^2$

ΔAXC: $A = 1024\ m^2$

ΔBXC: $A = 1393\ m^2$

Total Area $\doteq 3658 m^2$

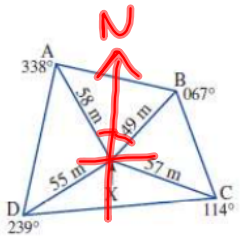
COMPASS RADIAL SURVEY

A Compass Radial Survey is different in that it has bearings given on each of the arms.

The figure on the right shows a compass radial survey of a block of land.

a Calculate the size of ∠AXB.

b Hence, calculate the distance AB, correct to the nearest metre.



a) $360° - 338° = 22°$

$\therefore \angle AXB = 89°$

b) $AB^2 = 58^2 + 49^2 - 2 \times 58 \times 49 \times \cos 89°$

$AB = 75m.$